

# EFFECT OF HAND AND FINGER EXERCISES FOR 4 WEEKS ON GRIP AND PINCH STRENGTH AMONG SMARTPHONE

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## **Abstract:**

**BACKGROUND:** The popularity & functions offered in the smart phones, there has been an increase in demand and according to a new study texting & using mobile devices for long periods of time could lead to a lower life expectancy and the incidence of

musculoskeletal impairment of hand, wrist, forearm, arm and neck has been increasing all over the world due to prolonged forceful, low amplitude, repetitive use of smart phones.

**AIM & OBJECTIVE:** To find out the effect of hand and finger exercises on grip and pinch strength among high smartphone users of the 4 weeks.

**Methodology:** 30 subjects of age group 18- 25 years were selected, who fulfilled the inclusion Criteria. Out of the 30 smartphone users 15 subjects who were using smartphone for at least 4 hours minimum per day and also those who scored more than 25 in

smartphone addiction scale .15 subjects who selected were treated with hand and finger exercise for a period of 4 weeks. The exercise comprises of seven simple strengthening and stretching exercises. The pre-test and post-test measurement was taken using hand held dynamometer and pinch dynamometer.

**RESULT:** The pre-test and post-test mean values of hand-held dynamometer and pinch dynamometer was analysed using the paired 't' test. For 14 degrees of freedom and 5% level of significance, the table's value is 2.14 and calculated 't' value 16.89 & 20.87. Since the calculated value was greater than table's value null hypothesis is rejected.

**CONCLUSION:** This study it can be concluded that grip strength and pinch strength would be improved after general hand and finger exercises for 4 weeks among high smartphone users.

**Keywords:** Smart phone, hand held dynamometer, pinch dynamometer, smartphone addiction, grip strength, pinch strength, lateral pinch

## **INTRODUCTION:**

The phones are becoming central to our everyday lives. They serve as a means to fulfil tasks both at work & home. [1] The word 'SMART PHONE' was introduced years ago, but the meaning has been changed over time. Due to the popularity & functions offered in the smart phones, there has been an increase in demand and according to a new study texting & using mobile devices for long periods could lead to a lower life expectancy. [34] The new research could also suggest a link between forward leaning postures that people use while Texting, Going Online, Sending Emails & Playing Video Games, & Hyper kyphosis, which is associated with pulmonary diseases & cardiovascular problems. 'Posture has been an overlooked factor in our health but research is helping us to raise awareness of it & people are now beginning to realize that good posture is more than about how it makes you look; it's important for your health on a day basis & it can be important in terms of your life expectancy. Mobile phone users are communicating others by voice and by a wide range of text button usage by means of short message service, WhatsApp, and social networking applications like face book, twitter and Skype. The incidence of musculoskeletal impairment of upper limb and neck has been increasing all over the world due to prolonged and, repetitive use of phones. Sustain gripping and repetitive movements with the thumb and fingers have been identified as risk factors to lead the disorders of the thumb and musculature in the forearm. The hand is frequently used in daily living activities and industrial fields because of its many functions. This can cause numerous musculoskeletal disorders in the hand such as De Quervain's tenosynovitis, trigger finger, ganglionic cysts, hand arm vibration syndrome, of thumb. Individuals with hand MSDs are limited in their activities due to their reduced grip strength and capability. Smartphones resulted in a serious behavioural addiction, The higher figure in adults to individuals in their twenties than in their thirties to forties implies that this problem may worsen in the future. The function of hand is evaluated using grip and pinch strength. Pinch strength is measured using a pinch gauge. It is imperative that physical therapists use accurate measures when assessing pinch strength. This includes consistent use of assessment tools among raters. Hand and finger exercises improve the hand functions and prevent the hand dysfunctions. Hand and finger exercises can improve strength and provides more support to hold the smartphones. In addition, this type of stretching exercises can help to relieve muscle tension. To relieve adverse health effects, mobile phone users should avoid prolonged usage of smartphones. Since the number of studies on smartphone users and effects of general stretching and strengthening exercises is understudied, this study intends to find the effects of those exercises on grip and pinch strength after 4 weeks of training.

**METHODOLOGY:**

A total number of fifteen subjects were selected in outpatient department of swamy vivekanandha institute of health sciences department of physiotherapy by purposive sampling method by who fulfilled the inclusion criteria. The study was pretest and post-test for a single group experimental study in nature. The treatment was conducted for a period of 4 weeks. The subject was selected by using purposive sampling method. pretest taken using pinch dynamometer (lateral pinch) and hand-held dynamometer assigned to hand finger exercise and then post-test taken using pinch dynamometer (lateral pinch) and hand-held dynamometer. The Inclusion Criteria are patients Age between 18 – 25 years Only male patient has selected in this study, 25 text messages or e-mails and messengers (WhatsApp, Facebook, twitter, hike) per day Browsing the internet or playing games (Finger using) for more than 1 hour per day. Scoring more than 25 in smartphone addiction scale. The Exclusion Criteria are Open wounds, Sensory impairment, Neurological conditions of upper limb, Musculoskeletal injuries in forearm, wrist, hand Hansen's disease, Fracture treated with metal implants. Before the patient treatment all the patient all the subjects were explained about the study and the procedure to be applied. They were asked to inform if they any discomfort during the course of study. Written consent was obtained from the subjects.

**PROCEDURE:**

The person is made to sit comfortably in a chair with arm at side and initial strength measured. Which the subject is seated upright against the back of a chair with feet flat on the floor. The shoulder adducted and neutrally rotated, the elbow flexed at 90° and the forearm in neutral and wrist between 0° and 30° of extension. and the grip strength is measured in kilogram-force.

**PINCH DYNAMOMETER (lateral pinch)****Position:**

Which the subject is seated upright against the back of a chair with feet flat on the floor. The shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm in neutral position, and wrist in neutral. and the pinch strength is measured in the kilogram-force

**HAND AND FINGER EXERCISES (all exercises for 2 session per day)****1. Pinch Strengthener**

This exercise helps strengthen the muscles of your fingers and thumb. It can help you turn keys, open food packages, and use the gas pump more easily. Pinch a soft foam ball or some putty between the tips of your fingers and your thumb. Hold for 60 seconds. Repeat at a 10 times.

**Finger Lift**

Use this exercise to help increase the range of motion and flexibility in your fingers. Place your hand flat, palm down, on a table or other surface. Gently lift one finger at a time off of the table and then lower it. You can also lift all your fingers and thumb at once, and then lower. Repeat at a 10 times.

**Thumb Extension**

Strengthening the muscles of your thumbs can help you grab and lift heavy things like cans and bottles. Put your hand flat on a table. Wrap a rubber band around your hand at the base of your finger joints. Gently move your thumb away from your fingers as far as you can. Hold for 60 seconds and release. Repeat at 10 times.

**Make a Fist**

Hand and finger exercises can help strengthen your hands and fingers, increase your range of motion, and give you pain relief. Stretch only until you feel tightness. Start with this simple stretch: Make a gentle fist, wrapping your thumb across your fingers. Hold for 60 seconds. Release and spread your fingers wide.

**Finger Stretch**

Try this stretch to help with pain relief and to improve the range of motion in your hands. Place your hand palm-down on a table or other flat surface. Gently straighten your fingers as flat as you can against the surface without forcing your joints. Hold for 30 to 60 seconds and then release. Repeat at a 10 times.

**Grip Strengthener**

Hold a soft ball in your palm and squeeze it as hard as you can. Hold for a few seconds and release. Repeat at a 10 times..

**DATA ANALYSIS****HAND HELD DYNAMOMETER**

Mean values (kgs)		Calculated 't' value	Table 't' value	Level of Significance
Pre test	Post test			
36.13	45.33	16.89	2.14	P < 0.05 significant

The pre test and post test mean values of hand held dynamometer was analysed using the paired 't' test. For 14 degrees of freedom and 5% level of significance, the table 't' value is 2.14 and calculated 't' value 16.89. Since the calculated 't' value was greater than table 't' value null hypothesis is rejected.

**PINCH DYNAMOMETER (lateral pinch)**

Mean values (kgs)		Calculated 't' value	Table 't' value	Level of Significance
Pre test	Post test			

12.93	20.27	20.87	2.14	<b>P &lt; 0.05 significant</b>
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The pre test and post test mean values of pinch dynamometer was analysed using the paired 't' test. For 14 degrees of freedom and 5% level of significance, the table 't' value is 2.14 and calculated 't' value 20.87. Since the calculated 't' value was greater than table 't' value null hypothesis is rejected.

### Result:

This study was conducted on 15 subjects. To find out high smart phone users was used smartphone addiction scale and usage of smartphones for how many hours in day was noted. Smartphone addiction scale used was short version. The pre test and post test mean values of hand held dynamometer and pinch dynamometer was analysed using the paired 't' test. Since the calculated 't' value was greater than table 't' value null hypothesis is rejected. The overall result of this study is hand & finger exercises improved the grip and pinch strength after of 4 weeks among high smartphone users

### Discussion:

The smart phones has become central to our everyday life. According to **Smura et al** [33], in most developed countries, mobile phone have become an inseparable part of everyday life and a majority of people carry them all the time. In addition, the population of smart phone users has been increasing over the last few years. There is much complication associated with using smartphones such as sleeplessness, wrist pain, memory loss, and neck pain, etc.

According to Dr Pradeep Moonot orthopaedic from candy hospital trust in Mumbai, "excessive smartphone use can lead to injuries that cause strain and stress from repetitive motion."

A smartphone users to engage in repetitive flexion and extension of the wrist and to use their thumb to text movements that are involved in the etiopathology of carpal tunnel syndrome. The issue is of increasing importance as more young people use smartphone and other hand held devies. Duration of daily smartphone use in the most important factors affecting the median nerve, pinch strength, and hand function, said Dr Inal [36]

The aim of this study in to find out the effects of hand and finger exercises on grip and pinch strength in smartphone over users.

This study was conducted on 15 subjects. To find out high smart phone users was used smartphone addiction scale and usage of smartphones for how many hours in day was noted. Smartphone addiction scale used was short version. (**SAS-SV; Kwon, Kim , Cho & yang, 2013**). The total score of the scale ranges from 0-40. Higher scores from the scale indicate higher level of the smartphone addiction.

Outcome measures included the grip strength and pinch strength by hand held dynamometer and pinch dynamometer which was measured prior to treatment (pre test) and at the end of 4 weeks of treatment (post test).

In this study aim was to find out the effectiveness on hand and finger exercises improving on grip strength and pinch strength. The overall effectiveness on hand held dynamometer and pinch dynamometer score was analyzed by paired 't' test after 4 weeks treatment which shows  $p < 0.05$  which is significant.

From this study it can be concluded after hand & finger exercises improved the grip and pinch strength after of 4 weeks among high smartphone users.

### Conclusion:

The aim of study is find out the effect of hand and finger exercises improving on grip and pinch strength among high smartphone users. 30 high smartphone users were selected and assessed. Those who had smartphone addiction scale score more than 25 and minimum usage of phone for 4 hours. Out of 30 members 15 subjects were selected. They received hand finger exercises.

The grip strength and pinch strength was measured before and after treatment session (4 weeks) by using hand held dynamometer and pinch dynamometer. Pre test and post test values of the study was collected and assessed for significant difference and their results were analyzed by using paired 't' test.

This study concluded that hand & finger exercises improved the grip and pinch strength after 4 weeks among high smartphone users

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